

# Safeguarding California: Preparing for Climate Risks

*An Update to the 2009 Adaptation Strategy*

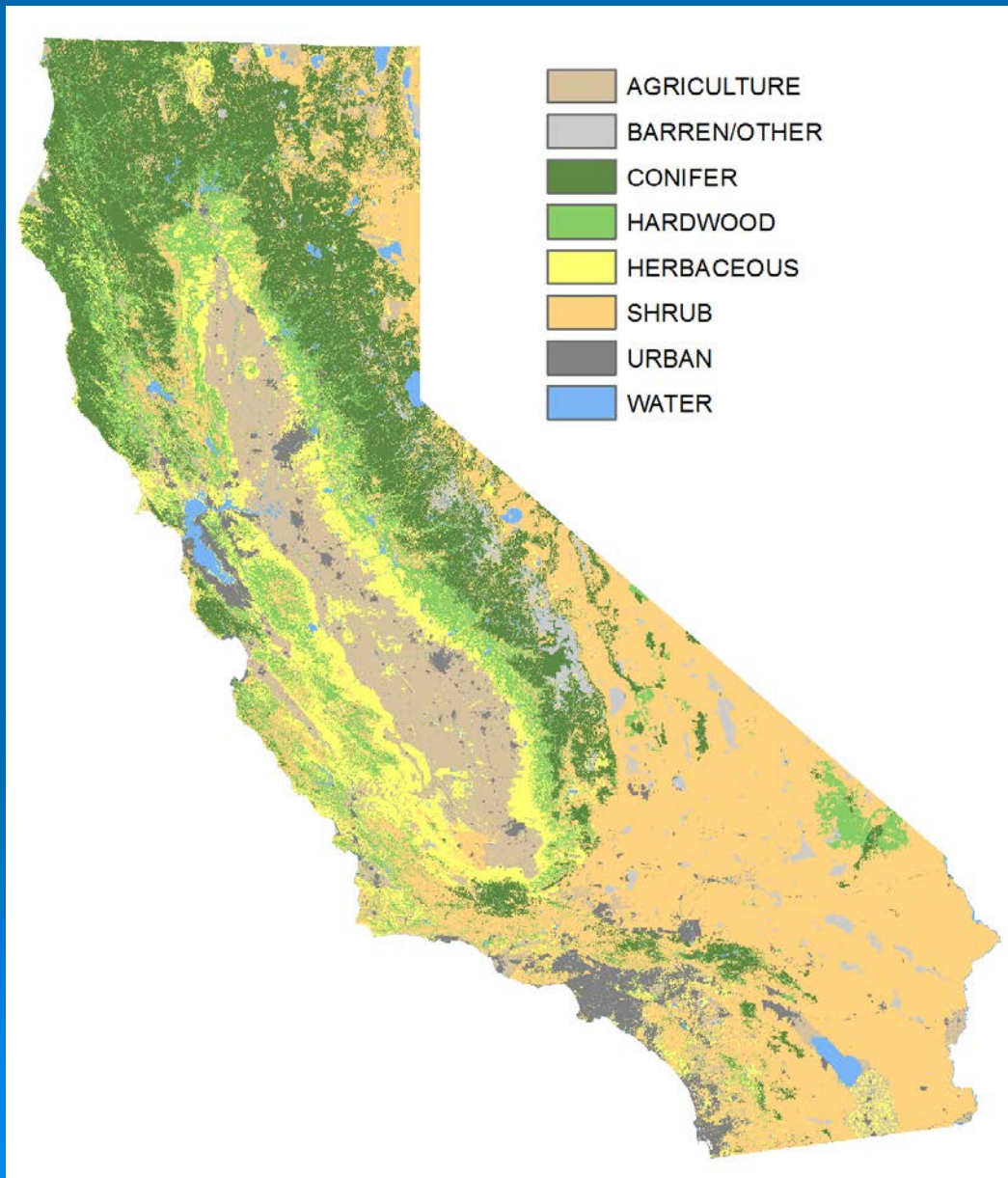
## California's Forests and Resilience to Climate Change



California Department of Forestry and Fire Protection



# California Forests



# California Forests - Ownership

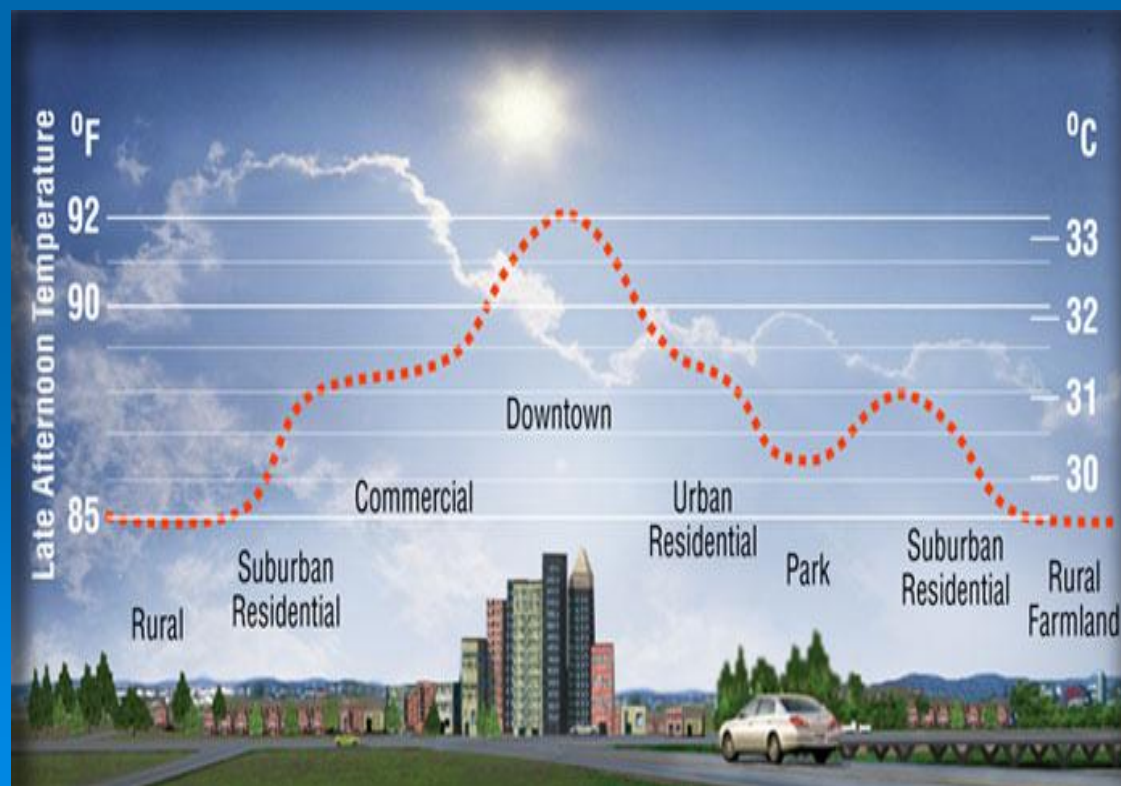
Forest land base is divided between private and public management. Policy approaches for maintaining and enhancing carbon storage on these lands will need to consider different management objectives and legal mandates.

Ownership		Acres	Percent
Private	Unreserved Timberland	8,780,000	26%
	Unreserved Other Forest	4,236,000	13%
	Forested NGO	115,000	< 1%
	<i>Subtotal</i>	<i>13,131,000</i>	
Public	Unreserved Timberland	10,557,000	32%
	Unreserved Other Forest	3,771,000	11%
	Reserved Forest	5,928,000	18%
	<i>subtotal</i>	<i>20,256,000</i>	
	<b>Total</b>	<b>33,387,000</b>	<b>100 %</b>

\* Tribal lands are sovereign, but for sake of simplicity are included in private land ownership.

# California Forests - Urban

- 5% of the state's land is urban and is home to 94% of population.



Urban areas have a high concentration of impervious surfaces and structures that absorb and radiate heat and create "urban heat islands." Impervious surfaces also increase stormwater runoff and affect water quality.



# Climate Change Impacts and other Risks to our Forests



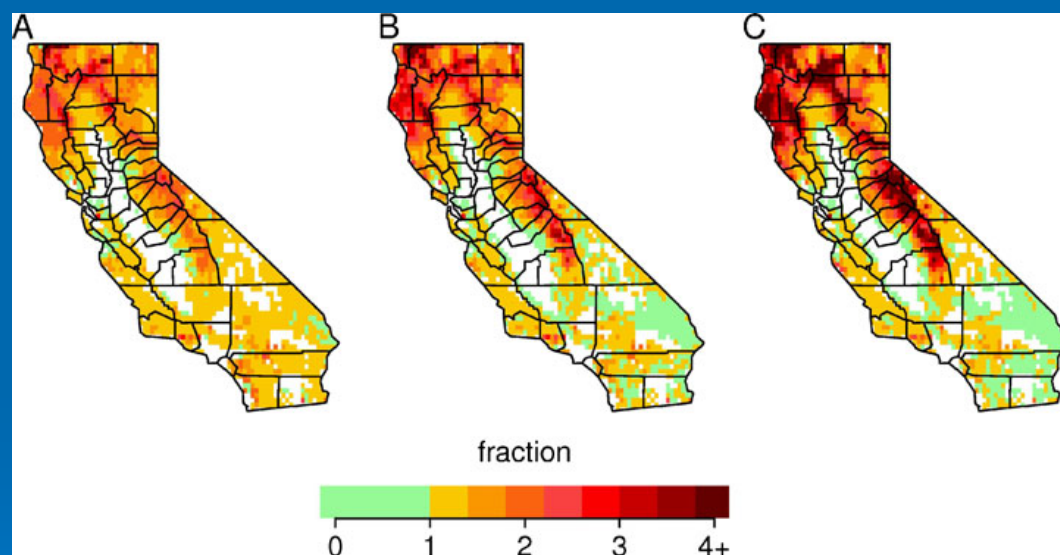
# Climate Change Impacts on Forests

FACTOR	DESCRIPTION
Hydrologic	Changes in temperature, precipitation, and hydrologic processes (i.e. decreased snow pack, earlier spring runoff, lower summer base flows).
Fire	Changes in the extent and frequency of disturbances from wildfires, pests, and disease outbreaks.
Biologic	Conditions may favor the spread of invasive species.
Biologic	Tree species expected to move northward or to higher altitudes.
Biologic	Changes in reforestation and regeneration success.
Biologic	Changes in forest productivity affecting growth and carbon storage. The effect of additional CO <sub>2</sub> on forest productivity is uncertain.
Economic	Economic impacts from increased fire damage and fire suppression costs.



# Wildfire Issues

Most forest species in California have evolved in fire prone landscapes; wildfire plays a critical role in maintaining ecosystem health. Wildfire also poses significant threats to life, property, public health, infrastructure, and water quality.

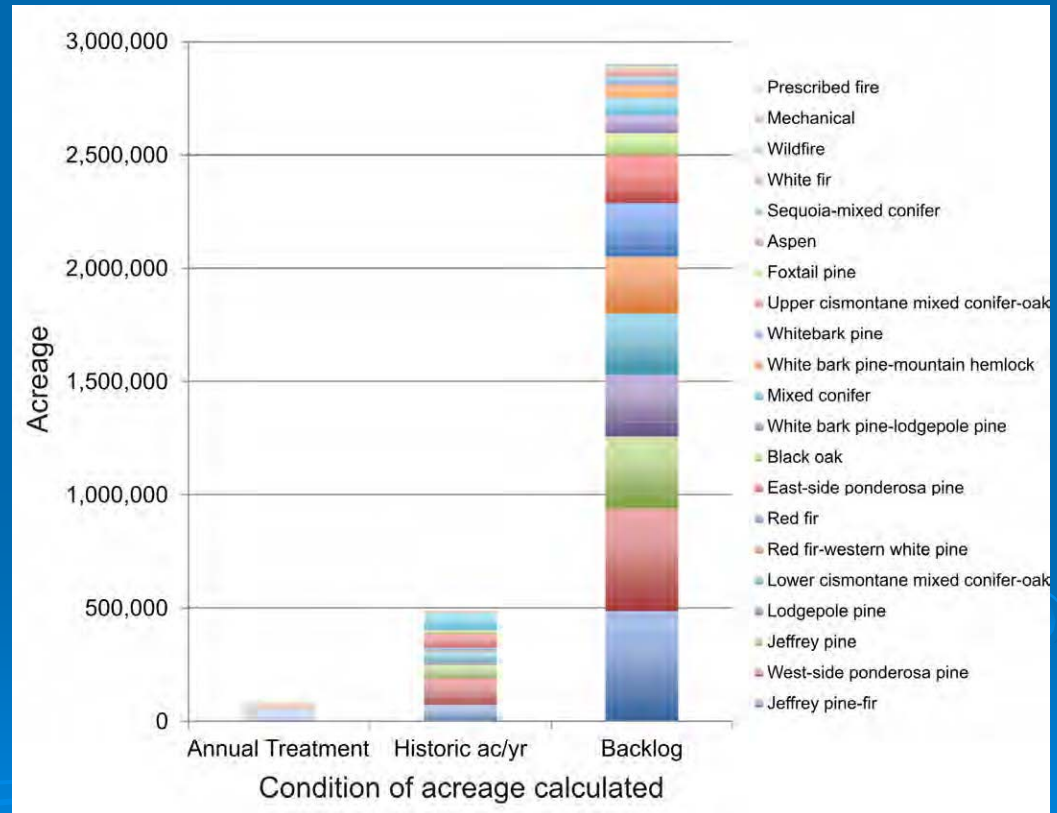


Annual area burned by wildfire is predicted to increase substantially under future climate change scenarios (Westerling, et al. 2011).



# Forest Health – Restoration Needs

Following decades of fire suppression many forest stands across the Sierra are overstocked with small trees and high fuel loads that are at risk to high severity fire, and insect/disease outbreaks.



Recent study estimates that almost 3 million acres across the Sierra would benefit from fuel reduction treatments. (North *et al.*, 2012)



# Loss of Forestland to Conversion

- Forests, particularly oak woodland, are being fragmented and converted to other uses, such as urban areas, rural home sites, and vineyards.
- Conversions can shift areas from net carbon sinks to net carbon emitters, with attendant losses of ecosystems services.
- An estimated 16,000 acres converted annually from forest land to urban development; almost 2 million acres of forest land at medium to high risk of development (FRAP, 2010; Sleeter et al., 2010).
- Conservation easements and forestry assistance programs are important tools for preventing conversion.



# Managing our Forests for Climate Resilience





# Climate Adaptation and Mitigation fit Hand-in-Glove on Our Forestlands

- Improving forest health makes forests more resilient to climate impacts, as well as increasing their carbon storage capacity.
- Reducing wildland fire risks, including use of fuels management techniques, protects natural resources, people and homes, and the large amounts of carbon stored in our forests.
- Careful selection of tree species and seed sources can help to enhance the long-term survival and carbon storage potential of trees planted today (e.g., reforestation of the Rim Fire area; tree planting in urban areas).

# Climate Adaptation and Mitigation fit Hand-in-Glove on Our Forestlands

- Materials removed from forests to improve climate resilience (e.g., forest thinning, fuels reduction) provide a biofuels resource that can reduce use of fossil fuels.
- Current barriers to forest biomass utilization are associated with energy prices, infrastructure costs, and market uncertainties.






# All Forests Must Be Addressed

Adaptation strategies for the forest sector need to recognize all forestlands, regardless of ownership, including urban forests.

- The majority of the forest land base in California is on federal lands.
- While public and private lands are managed for different objectives, how these lands are managed can greatly influence their ability to become more resilient to climate change and to sequester carbon and provide other important environmental services.
- Addressing climate resilience on forestlands provides many co-benefits in addition to carbon capture and storage:

# Co-Benefits

- Protection and enhancement of fish and wildlife habitat;
  - Protection of water and air resources;
  - Reduced urban heat islands effects (health and energy demand);
  - Reduced wildland fire risks;
  - Reduced flooding and mudflows
  - Both urban & wildland forest projects can be targeted to address needs of disadvantaged communities.
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# CAL FIRE Programs for Climate Resilience

CAL FIRE's programs involve collaboration with many other government entities (federal, state, local), private land owners, and nongovernmental organizations.

- Urban and Community Forestry Program
- California Forest Improvement Program
- Vegetation Management Program
- Forest Legacy Program
- Forest Pest Management Program
- Reforestation Services Program

